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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,812	02/08/2001	Sudipta K. Ray	END920010002US1	5588

5409 7590 06/14/2002

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EXAMINER

NGUYEN, HA T

ART UNIT PAPER NUMBER

2812

DATE MAILED: 06/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/779,812

Applicant(s)

RAY ET AL.

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-10, 12-19, 24, 30, 32 and 34 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6, 20-23, 25, 27, 28, 31, 33 is/are rejected.
- 7) ☒ Claim(s) 4, 26 and 29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Notice to applicant

1. Applicants' Amendment and Response to the Office Action mailed 01-31-02 has been entered and made of record (Paper No. 9).

Response to Amendment

2. In view of applicants' statement concerning the common ownership of Desai et al. (US Patent 6281581) and the instant application, the rejection of claims 5, 7-12, 16-19, 22, 24, 25, 27-30 under 35 U.S.C. 103, as being unpatentable over Desai et al. alone or in combination with other references has been withdrawn.

Applicants' arguments with regard to the rejections under 35 U.S.C. 102 or 103 have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicants argued that Kang et al. (YOR 919950085US1, hereinafter "Kang") does not teach or suggest that the solder balls were actually soldered to the solderable layer. The examiner disagrees, even though as applicants suggested, a solder may be formed by some other methods, as the name "solder" itself, the dominant method is still soldering especially when the solder balls are situated on a solderable layer. If it is not soldered why the phrase "solderable layer" is used. Even if YOR does not actually use soldering, at least it suggests soldering by using solder ball on a solderable layer. Therefore the rejection of claims 1-3, 6, 20, 21, and 23 is proper.

Applicants are referred to the modified statement of the rejection given below.

Claim Objections

3. Claims 25 and 29 are objected to because of the following informalities: Claim 25 is a duplicate of claim 21 and claim 29 has two end period ".". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. Claims 26-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 26-28 recites the limitation " the joiner solder" in lines 1. There is insufficient antecedent basis for this limitation in the claim. Note: it appears that errors have been made, it is more logical that claims 25- 28 should depend from claim 24 not claim 20.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103[©] and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-3, 5, 6, 20-23, 25, 31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al., YOR919950085US1 (Hereinafter Kang).

Kang discloses a method for forming an electronic structure and inherently the structure formed by the method, the method comprising the steps of providing a substrate (solderable layer of Ni, Co, Fe...); and soldering a lead-free solder member to the substrate without using a joining solder to effectuate the soldering, wherein the solder member comprises a tin-antimony alloy that includes predominantly Sn and about 1-10 % Sb by weight (See page 4); wherein the soldering step includes inherently reflowing the solder member to make it adhere to the substrate (see page 2); wherein the substrate includes a semiconductor chip (see page 2); and wherein the solder member is a solder ball (see page 2).

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But it does not disclose expressly the claimed range of percentage of Sb and wherein the substrate includes a ceramic ball grid array module or a plastic ball grid array module.

However, it has been shown that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists (see MPEP 2144.05). Besides, substrate including a ceramic ball grid array module or a plastic ball grid array module is widely used in the art, for efficiency.

Therefore, it would have been obvious to use Kang's teaching to obtain the invention as specified in claims 1-3, 5, 6, 20-23, 25, 31, and 33.

7. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang, as applied to claims above, in view of Sakai et al., US Patent 6077477 (hereinafter Sakai).

Kang discloses substantially the limitations of claim 28, as shown above.

But it does not disclose expressly the use of a joiner solder comprising a Sn-Ag-Cu alloy and the content of each metal in the alloy .

However, the missing limitations are well known in the art because Sakai discloses these features (See abstract) .

A person of ordinary skill is motivated to modify Kang with Sakai to obtain excellent thermal fatigue resistance (see abstract) .

Therefore, it would have been obvious to combine Kang with Sakai to obtain the invention as specified in claim 28 .

Allowable Subject Matter

8. Claims 4 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 26 should be rewritten to also overcome the rejection under 35 USC 112 , 2nd paragraph.

Claims 7-10, 12-19, 24, 30, 32, and 34 are allowed. Claim 29 would be allowable if rewritten to overcome the objection for informality.

Claim 4 recites the feature " wherein the soldering step reduces a height of the solder member between about 25% and 30%".

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Claim 26 recites the feature "wherein the tin-antimony is intermixed with the joiner solder".

Claims 7 and 24 recite soldering the solder member to a second substrate with a lead-free joiner solder.

These features in combination with the other elements of the claims are neither disclosed nor suggested by the prior art of record.

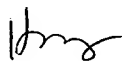
Claims 8-10, 12-19, 29, 30, 32, and 34 depends from claim 7 or 24, they are allowed for the same reason.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (703)308-2706 . The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Neibling, can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Ha Nguyen
Primary Examiner
06 - 07 - 02